

## CLAIMS

What is claimed is:

- 1           1.     A medical device for delivering a medicament to a patient,  
2     comprising:  
3           a syringe assembly comprising:  
4                 a barrel having a forward end and a rear end and defining a  
5     reservoir within which the medicament may be contained;  
6                 a needle cannula having a forward tip and being coupled to said  
7     forward end of said barrel and in fluid communication with said reservoir; for delivering  
8     the medicament to the patient when said forward tip pierces the patient; and  
9                 a plunger having a first end with a stopper positioned in said  
10    reservoir and a second end having a thumb pad for receiving medicament delivery  
11    pressure for causing said plunger to move within said reservoir to cause the  
12    medicament to be expelled from said reservoir through said needle cannula forward tip;  
13                 a hollow shield body disposed on said front portion of said syringe barrel  
14    and releasably secured thereto, said shield body being selectively movable from a first  
15    position wherein said needle cannula forward tip is exposed, to a second position  
16    wherein said needle cannula forward tip is contained within said hollow shield body;  
17                 an urging member positioned between said hollow shield body and said  
18    barrel for imparting an urging force to said shield body for urging said shield body to  
19    said second position; and

20 an actuator mounted to said syringe barrel, said actuator axially movable  
21 from an initial position on said syringe barrel to a retracted position away from said  
22 needle cannula forward tip in response to the commencement of an application of the  
23 medicament delivery force to said thumb pad for releasing said hollow shield body from  
24 said barrel to allow said hollow shield body to move, under the urgency of said urging  
25 member, to said second position upon removal of said needle cannula tip from the  
26 patient.

1 2. The medical device of claim 1, wherein said syringe barrel is glass.

1 3. The medical device of claim 1, wherein said syringe barrel is  
2 plastic.

1 4. The medical device of claim 1, wherein said syringe barrel  
2 comprises a cylindrical barrel portion for holding the medicament and a front portion  
3 arranged proximate said front end of said syringe barrel for coupling to said cannula and  
4 said shield.

1 5. The medical device of claim 4, wherein said cylindrical barrel  
2 portion of said syringe barrel is glass and said front portion of said syringe barrel is  
3 plastic.

1           6.     The medical device of claim 1, further comprising a retaining device  
2     formed on said hollow shield body for causing releasable securement of said hollow  
3     shield body to said front portion of said syringe barrel, said retaining device causing a  
4     release of said hollow shield body from said syringe barrel upon movement of said  
5     actuator to said retracted position.

6  
1           7.     The medical device of claim 6, wherein said retaining device  
2     comprises one of a catch element and a retaining element arranged on said front end of  
3     said syringe barrel, the other of said catch element and said retaining element being  
4     arranged on said hollow shield body, said catch element engaging said retaining  
5     element for preventing said hollow shield body from moving from said first position  
6     toward said second position.

1           8.     The medical device of claim 7, wherein said retaining element  
2     comprises a flexible arm on said hollow shield body.

1           9.     The medical device of claim 8, wherein said release mechanism  
2     comprises a portion of said actuator arranged to move said flexible arm to release said  
3     hollow shield body from said retention means when said actuator is moved to said  
4     retracted position.

1           10.    The medical device of claim 9, wherein said portion of said actuator  
2 arranged to move said flexible arm comprises a cam arranged on an inner surface of  
3 said actuator.

1           11.    The medical device of claim 10, wherein said cam further  
2 comprises a locking surface for engaging said hollow shield body when said hollow  
3 shield body is in the second position for preventing said hollow shield body from moving  
4 back toward the first position.

1           12.    The medical device of claim 8, wherein said flexible arm is  
2 arranged on said hollow shield body and said catch is connected proximate said front  
3 end of said syringe barrel.

1           13.    The medical device of claim 8, wherein the flexible arm is  
2 connected proximate said front end of said syringe barrel and said catch is arranged on  
3 said hollow shield body.

1           14.    The medical device of claim 1, further comprising a first blocking  
2 device on said barrel for retaining said actuator in said retracted position.

1           15.    The medical device of claim 14, wherein said first blocking device  
2 comprises an actuator catch arranged on said actuator and a projection on said syringe

3 barrel, said catch engaging said projection to retain said actuator in said retracted  
4 position.

1           16. The medical device of claim 6, further comprising a first blocking  
2 device on said barrel for retaining said actuator in said retracted position, and wherein  
3 said retaining device comprises a flexible arm having a projection arranged on said  
4 syringe barrel and a shield catch being arranged on said hollow shield body for  
5 engaging said projection when said shield is in said fully inserted position, said first  
6 blocking device comprising an actuator catch arranged on said actuator and an actuator  
7 projection arranged on said syringe barrel for engaging said actuator catch when said  
8 actuator is in said retracted position.

1           17. The medical device of claim 6, further comprising a first blocking  
2 device on said barrel for retaining said actuator in said retracted position, and wherein  
3 said retaining device comprises a shield catch arranged on said syringe barrel, a flexible  
4 arm having a projection arranged on said hollow shield body for engaging said shield  
5 catch when said shield is in said first position, said first blocking device comprising an  
6 actuator catch arranged on said actuator and an actuator projection arranged on said  
7 syringe barrel for engaging said actuator catch when said actuator is in said retracted  
8 position.

1           18.    The medical device of claim 6, further comprising a first blocking  
2 device on said barrel for retaining said actuator in said retracted position, and a second  
3 blocking device for preventing movement of said actuator away from said retracted  
4 position when said actuator is in said initial position.

1           19.    The medical device of claim 1, further comprising a removable clip  
2 connectable to said syringe barrel for preventing movement of said actuator to said  
3 retracted position while said clip is connected to said syringe barrel.

1           20.    The medical device of claim 6, wherein said shield, said urging  
2 member, and said retention means are arranged in front of a medicament holding  
3 portion of said syringe barrel.

1           21.    The medical device of claim 1, wherein said urging member device  
2 comprises a spring.

1           22.    The medical device of claim 1, wherein said actuator further  
2 comprises a locking element for preventing movement of said hollow shield body from  
3 said second position back toward said first position.

1                   23.    The medical device of claim 1, wherein a front end of said actuator  
2   comprises a lip for retaining at least a portion of said shield at said second position  
3   when said shield is moved to said second position.

1                   24.    The medical device of claim 23, wherein said hollow shield body  
2   comprises a radially outward extending pin which is received in a slot defined in said  
3   actuator for guiding movement of said hollow shield body from said first position to said  
4   second position, wherein an end of said slot retains said shield at said second position  
5   when said hollow shield body is moved to said second position, wherein said end of  
6   said slot and said lip are axially offset such that said hollow shield body is misaligned  
7   with a longitudinal axis of said cannula when said hollow shield body is in said second  
8   position.

1                   25.    The medical device of claim 1, wherein said hollow shield body  
2   comprises a radially outward extending pin which is received in a slot defined in said  
3   actuator for guiding movement of said hollow shield body from said first position to said  
4   second position, wherein an end of said slot retains said hollow shield body at said  
5   second position when said hollow shield body is moved to said second position.

1                   26.    The medical device of claim 1, wherein said urging member  
2   comprises a coil spring.

1           27.    The medical device of claim 1, wherein said actuator is moved to  
2   said retracted position in response to the application of the medicament delivery force  
3   before said plunger rod is moved into said syringe barrel for delivering the medicament.

1           28.    A combination of a syringe assembly and a shield system;  
2           wherein said syringe assembly comprises a barrel having a forward end  
3   and a rear end and defining a reservoir within which the medicament may be contained,  
4   a needle cannula having a forward tip and being coupled to said forward end of said  
5   barrel and in fluid communication with said reservoir; for delivering the medicament to  
6   the patient when said forward tip pierces the patient, and a plunger having a first end  
7   with a stopper positioned in said reservoir and a second end having a thumb pad for  
8   receiving medicament delivery pressure for causing said plunger to move within said  
9   reservoir to cause the medicament to be expelled from said reservoir through said  
10   needle cannula forward tip; and

11           wherein said shield system comprises a hollow shield body disposed on  
12   said front portion of said syringe barrel and releasably secured thereto, said shield body  
13   being selectively movable from a first position wherein said needle cannula forward tip  
14   is exposed, to a second position wherein said needle cannula forward tip is contained  
15   within said hollow shield body, an urging member positioned between said hollow shield  
16   body and said barrel for imparting an urging force to said shield body for urging said  
17   shield body to said second position, and an actuator mounted to said syringe barrel,  
18   said actuator axially movable from an initial position on said syringe barrel to a retracted



19 position away from said needle cannula forward tip in response to the commencement  
20 of an application of the medicament delivery force to said thumb pad for releasing said  
21 hollow shield body from said barrel to allow said hollow shield body to move, under the  
22 urgency of said urging member, to said second position upon removal of said needle  
23 cannula tip from the patient.

1 29. The combination of claim 28, wherein said syringe barrel is glass.

1 30. The combination of claim 28, wherein said syringe barrel is plastic.

1 31. The combination of claim 28, wherein said syringe barrel comprises  
2 a cylindrical barrel portion for holding the medicament and a front portion arranged  
3 proximate said front end of said syringe barrel for coupling to said cannula and said  
4 hollow shield body.

1 32. The combination of claim 31, wherein said cylindrical barrel portion  
2 of said syringe barrel is glass and said front portion of said syringe barrel is plastic.

33. The combination of claim 28, wherein said shield assembly further  
comprises

1 34. The combination of claim 33, wherein said syringe barrel comprises  
2 one of a catch element and a retaining element arranged proximate a front end thereof  
3 and said retention device comprises the other of a catch element and a retaining  
4 element arranged on said shield, said catch element engaging said retaining element  
5 for preventing said shield from moving toward said second position when said shield is  
6 in said first position.

1           35.    The combination of claim 34, wherein said one of a catch element  
2   and a retaining element comprises a catch element arranged on a web connected to  
3   said syringe barrel.

1           36.    The combination of claim 34, wherein said one of a catch element  
2   and a retaining element comprises a retaining element arranged on a flexible arm  
3   connected proximate said front end of said syringe barrel.

1           37.    The combination of claim 28, further comprising a first blocking  
2   device on said syringe barrel for retaining said actuator in said retracted position.

1           38.    The combination of claim 37, wherein said first blocking device  
2   comprises a projection on said syringe barrel and said actuator comprises a catch  
3   engaging said projection to retain said actuator in said retracted position.

1           39.    The combination of claim 38, further comprising a second blocking  
2   device on said syringe barrel for preventing movement of said actuator away from said  
3   retracted position when said actuator is in said initial position.

1           40.    The combination of claim 28, further comprising a second blocking  
2   device on said syringe barrel for preventing movement of said actuator away from said  
3   retracted position when said actuator is in said initial position.

1           41.    A medical device for delivering a medicament to a patient,  
2   comprising:

3               a syringe assembly comprising:

4                   a barrel having a forward end and a rear end and defining a  
5   reservoir within which the medicament may be contained;

6 a needle cannula having a forward tip and being coupled to said  
7 forward end of said barrel and in fluid communication with said reservoir; for delivering  
8 the medicament to the patient when said forward tip pierces the patient; and

9 a plunger having a first end with a stopper positioned in said  
10 reservoir and a second end having a thumb pad for receiving medicament delivery  
11 pressure for causing said plunger to move within said reservoir to cause the  
12 medicament to be expelled from said reservoir through said needle cannula forward tip;

13 a hollow shield body disposed on said front portion of said syringe barrel  
14 and releasably secured thereto, said shield body being selectively movable from a first  
15 position wherein said needle cannula forward tip is exposed, to a second position  
16 wherein said needle cannula forward tip is contained within said hollow shield body;

17 means for urging said shield body from said first position to said second  
18 position;

19 means for releasably retaining said hollow shield body to said syringe  
20 barrel; and

21 means for actuating said retaining means for causing said urging means  
22 to move said hollow shield body to said second position, said actuating means being  
23 actuated upon the commencement of an application of the medicament delivery force to  
24 said thumb pad.